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GLOSSARY OF TERMS RELATING TO GLASS AND GLASSWARE

(First Revision)

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GLOSSARY OF TERMS RELATING TO GLASS AND GLASSWARE

(First Revision)

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Indian Standard
GLOSSARY OF TERMS RELATING TO GLASS AND GLASSWARE
(First Revision)

0. FOREWORD

0.1 This standard was adopted by the Indian Standards Institution on 30 December 1981, after the draft finalized by the Glassware Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard was first published in 1961, under the title 'Glossary of terms relating to glass industry'. However, the Committee responsible for the preparation of the standard decided to revise it taking into consideration that a number of new terms have come to be used in the glass industry and needed incorporation in the glossary to make it comprehensive. In the preparation of this standard considerable assistance has been derived from the following publications:

C 162-71 Standard definitions of terms relating to glass and glass products. American Society for Testing and Materials, USA.

ISO/DIS/4791/1 Laboratory apparatus — Vacabulary for terminology relating to apparatus made essentially from glass, procelain or vitreous silica : Part I Names for items for apparatus. International Organization for Standardization (ISO).

ISO/DP/7086/I Glass and glass-ceramicware intended to come into contact with food — Release of toxic materials — lead and cadmium : Part I Method of test. International Organization for Standardization (ISO).

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1. SCOPE

1.1 This standard covers the terms and definitions relating to glass, glassware and related products.

1.2 This standard does not cover terms related to glass containers and their defects.

A

Acid Polishing — The polishing of a glass surface by acid treatment.

Air Bells — Bubbles of irregular shape formed generally during the pressing or moulding operations in the manufacture of optical glass.

Air Line — A greatly elongated bubble of small cross-section, usually exceeding 25 mm in length; occurring in tubing, rod or drawn flat glass.

Alabaster Glass — A milky-white glass that difuses light without fiery colour.

Alcove — A narrow channel to convey molten glass from refiner to forehearth, or to the revolving pot where it is gathered by the Owens machine.

Alkali — The oxides of sodium or potassium; less frequently of lithium.

Alkalinity — A measure of the alkali extracted from the glass under specified conditions.

Amber Glass — Glass varying in colour between light yellowish-brown and deep reddish-brown.

Ampoule — A glass container designed to be filled and sealed by fusion of the glass neck.

Angular Cut — *See* **'Out-of-Square End'**.

Annealing — A process to prevent or remove objectionable stresses in glass/glassware by controlled heating at and/or cooling from a suitable temperature.

Annealing Point — The temperature at which internal stresses disappear rapidly without deformation of the glass. It is also termed as upper annealing point. It corresponds to the equilibrium temperature at which the glass has a viscosity of $10^{13.4}$ poises (*see also* **'Strain Point'**).

Annealing Range — The range of glass temperature in which stresses in glass articles can be relieved at a commercially desirable rate. For purposes of comparing glasses, the annealing range is assumed to correspond with the temperature between the annealing point (AP) and the strain point (StP).

Antimony (Sb_2O_3) — An industrial term for antimony trioxide used as a refining agent.

Arch — A part of a furnace; a crown.

Arsenic (A_8O_3) — An industrial term for arsenic trioxide used as a refining agent.

B

Back Wall — The charging end wall of a glass-melting furnace.

Bad Distribution — Deviation from the intended distribution of wall thickness.

Badging — Marking of glass or glassware to indicate capacity or ownership or for other purposes, for example, trade-mark; also termed 'Labelling'.

Baffle — The part of a blank mould which seals the delivery or baffle hole.

Baffle Mark

a) Mark or seam on glass container resulting from a mould joint between blank mould and baffle plate.

b) A seam on the base corresponding to the joint of the baffle plate.

Baffle Wall — A wall used to deflect gases or flames in a furnace structure.

Bait — The tool dipped into molten glass to start any drawing operation.

Barium Crown Glass — An optical crown glass containing a substantial quantity of barium oxide.

Barium Flint Glass — An optical flint glass containing a substantial quantity of barium oxide.

Base — The bottom of a container.

Basic Fibre — Unprocessed glass fibres directly from the forming equipment.

Batch — The raw materials, properly proportioned and mixed, for delivery to the furnace.

Batch Charger — A mechanical device for introducing batch to the furnace.

Batch Feeder — *See* **'Batch Charger'**.

Batch House — The place where batch materials are received, handled, weighed, and mixed for delivery to melting units.

Batch Stone — Incompletely dissolved material from the glass making batch.

Bead

a) A small piece of glass rod or tubing fused round a wire.

b) An enlarged, rounded edge of a glass article, or any raised section extended around the article.

c) A small piece of glass, solid or hollow, of a given shape; for instance, beads used for jewellery.

Beading — *See* **'Bead'** (b).

Bearer Arch — One of a series of arches that support the checkerwork in regenerator.

Belt Marks — Marks made on the bottom of glass articles as they ride through the lehr on a chain belt slightly over-heated.

Bench — Floor of a pot furnace (*see also* **'Siege'**).

Bench Worker — A worker who forms glassware from tubing or rod by heating in a gas flame at a work bench, also called 'Table Blower', 'Blow Pipe Worker', 'Lamp Woker' and 'Glass Blower'.

Bend — *See* **'Bow'**.

Bending — The manipulation while hot of all or part of a flat glass to form curved shapes.

Bent Glass — Flat glass that has been shaped while hot into cylindrical or other curved shapes.

Bent Neck — A neck which has been bent so that its axis no longer lies in the intended direction.

Bevelling — The process of edge finishing flat glass to a bevel angle.

Bicheroux Process — An intermittent process of making plate glass in which the glass is cast between rollers on to driven conveyor roller or a flat moving table.

Birdcage — A thread of glass joining two points on opposite internal faces of an article.

Black Glass — A dark coloured glass having little or no visible transmission.

Black Spec — An almost insoluble grain of very dark coloured mineral coming from certain refractories or impurities in the raw materials.

Blank

a) A parison or preliminary shape from which a finished article is further formed; or mould for producing the same.

b) Any article of glass on which subsequent forming or finishing is required.

Blanks — Optical glass formed by pressing into the rough shape and size required in the finished, article, also called 'Pressings'.

Blanket Feed — A method for charging batch designed to produce an even idstribution of batch across the width of the furnace.

Blank Mould — The metal mould that first shapes the glass in the manufacture of hollow ware.

Blending Batch — Step-wise changes in batch composition to arrive at final change in finished glass.

Blib, Blibe — An elongated bubble.

Blisters — Relatively large bubbles or gaseous inclusions.

Bloach — An imperfection resulting from incompletely grinding plate glass, caused by a low place in the plate which retains part of the original rough surface.

Blob — *See* **'Hang Up'**.

Blobby Line — Graduation line starting or ending in a thickend blob.

Block

a) Refractory block any large piece of refractory.

b) Hollow translucent glass units having various patterns moulded on their interior, exterior or on both surfaces.

c) A lump of glass used for remelting for making generally bangles or beads.

Blocking

a) The process of shaping a gather of glass in a cavity of wood or metal.

b) The process of stirring and fining glass by immersion of a wooden block or other source of bubbles.

c) The process of reprocessing to remove surface imperfections.

d) The mounting of optical glass blanks in a shell for grinding and polishing operations.

e) The process wherein a furnace is idled at reduced temperatures.

f) The process of setting refractory blocks in a furnace.

Block Mould — A one-piece mould.

Block Reek, Rake — A scratch imperfection caused by cullet lodged in the polishing operation.

Bloom

a) A surface film resulting from attack by the atmosphere or from the deposition of smoke or other vapours (*see also* **'Smoked'**).

b) A surface film caused by slight chemical attack. This film can be removed by washing.

Blooming

a) Application to optical glass lenses of a non-reflecting film to reduce light scattering and back reflection.

b) Generally etching of an inadequately protected surface.

Blow-and-Blow Process — A process of forming hollow-ware in which both the preliminary and final shapes are formed by air pressure.

Blower — One who forms glass by blowing (*see also* **'Gaffer'**).

Blow Head — Part of a forming machine serving to introduce air under pressure to blow any hollow glass as article.

Blow Mould — The metal mould in which a blown glass article is finally shaped.

Blow-over — The thin-walled bubble formed above a blow mould in hand-shop operation to facilitate bursting off.

Blow Pipe

a) The iron pipe used by a glass maker for gathering and blowing by mouth, also called **'Blowingtion'**.

b) The burner used for working glass at a bench.

Blowing Iron — *See* **'Blow Pipe (a)'.**

Blown Away — Deficiency of glass in the neck of an internal screw-neck bottle (*see also* **'Hollow Neck'**).

Blown Glassware — Glassware formed by air pressure produced by mouth or by a machine.

Body — The attribute to molten glass, associated with viscosity and homogeneity, which is conductive to workability.

Body Mould — The part of a mould which forms the outer surface of a pressed glass article.

Boil

a) An imperfection consisting of a gaseous inclusion larger in size than seed; small bubbles.

b) The commotion caused by gases escaping from the melting batch.

Boost Melting — *See* **'Electric Boosting'.**

Boosting — An auxiliary method of heating in a glass furnace, for example, by passing an electric current through the molten glass, or by using an auxiliary burner.

Boot — A suspended enclosure in the nose of a tank protecting a portion of the surface and serving as a gathering opening.

Borate Glass — A glass in which the essential glass former is boric oxide (B_2O_3) instead of silica.

Borax Glass — Vitreous anhydrous sodium tetraborate ($Na_2B_4O_7$).

Bore — The internal diameter of a glass tube or the neck of a glass container.

Borosilicate Crown Glass — An optical crown glass containing substantial quantities of silica and boric oxide.

Borosilicate Glass — A silicate glass having a sufficient amount of boric oxide (B_2O_3) to influence its properties, in particular producing high chemical and thermal resistances.

Bounce — *See* '**Broken Ring**'.

Bow — Accidental departure from straightness in rod or tubing.

Bowl — *See* '**Spout**'.

Breast Wall

a) The entire side wall of a furnace between the flux block and the crown, but not including the ends.

b) Refractory wall between pillars of a pot furnace and in front of, or surrounding the front of a pot.

Breezing — Buckwheat anthracite coal or coarse sand spread on siege before setting of pots.

Bridge — The structure formed by the end walls of the adjacent melter and refiner compartments of a tank and the covers spanning the gap between the bridge walls.

Bridge Wall — That part of a glass melting furnace forming a bridge of or separation between melter and refiner.

Bridge (Wall) Cover — Refractory blocks spanning the space between bridge walls.

Bright Patch — A patch accidentally not ground on a ground surface.

Broken Line — *See* '**Broken Ring**'.

Broken Ring — The 'dotted' character of a graduation line caused by the scriber bouncing and removing insufficient wax resist before etching.

Broken Seed — A bubble, near the surface of the glass, the wall of which has been broken, most often during grinding.

Bruise — Localized surface crack, often star-shaped, caused by impact.

Brush Marks

a) A series of fine vertical laps on the outside surface of a bottle.

b) Fine parallel lines or laps running vertically on the external surface; similar in size and spacing to those left by a paint brush.

Bubble

a) Gaseous inclusion more than 0·5 mm.

b) A gaseous inclusion in the glass; generally spherical in shape but may be deformed in many ways during feeding (to the forming machine) or fabrication.

Buck — A dead plate.

Bulb Blower — A worker who blows glass into a mould.

Bulb Edge — The heavy rounded edge or bead of sheet-drawn glass.

Buldged Finish

a) A finish blown out so that the closure will not fit.

b) The mouth of an article blown out so that the closure will not fit.

Bulged Sides — Sides of an article bulged outwards.

Bull's Eye

a) A thick lens or round piece of glass.

b) Irregularity in thickness in the form of a convex lens, often in the base.

Burner

a) *See* **'Port'**.

b) A burner like Bunsen burner, blow pipe burner, fish tail burner, etc, used also for table blowing.

c) A burner for oil or gas heating furnaces.

Burner Block — Refractory block with one or more orifices through which fuel is admitted to a furnace.

Burn Off — The process of severing an unwanted portion of a glass article by fusing the glass.

Burnt Lime — Calcined limestone; CaO, MgO (dolomitic), or CaO (calcitic), or a mixture of these.

Burnt Mould — Discoloration or dulling due to local overheating of the mould.

Bursting Off — Breaking off a blown article from the end of the blow pipe.

Bursting Pressure — The internal pressure at which a glass container breaks.

Bush — *See* '**Orifice**'.

Bushing — A liner in the orifice of any feeder for molten glass; for example, the orifice ring of a gob feeder, or the unit through which molten glass is drawn in making glass fibres.

Button

a) A portion of a piece of pressed ware so designed that it is possible to knock it off to make a hole.
b) The portion at which a glass article is broken off from the pipe.
c) A small mass of molten glass stuck either on to the glass article or the pipe for further manipulation.

Bye-Hole — *See* '**Observation Hole**'.

C

Calibration — The process of checking the accuracy of graduated glassware.

Calibrator — A person who checks the accuracy of glass articles with appropriate instruments.

Camel Back — A constriction in capillary tubing for thermometer (*see also* '**Choke**').

Cameo — Glass of more than one layer of different colours, the top layers being carved in relief.

Campaign — The working life of a tank between major repairs which involve the cooling down of the tank to room temperature.

Canal — The part of a tank leading from the relatively wide fining area to the machine.

Cane — Solid glass rods.

Cap

a) Another name for crown.
b) To cut off the ends of a glass cylinder.
c) A type of bottle closure.

Cap Seat — The ledge inside the mouth of a milk bottle.

Carboy — Large narrow necket glass container, usually a ballon shape but sometimes more of a cylindrical shape having a capacity of more than 20 litres.

Carry-in — Manual lehr loading.

Cased Glass — Glassware whose surface layer has different composition from that of the main glass body.

Casehardened — A term sometimes used for tempered glass (*see* **'Tempered Glass'**).

Casement Wall — *See* **'Breast Wall (a)'.**

Casing Wall — *See* **'Breast Wall (a)'.**

Casting — A process of shaping glass by pouring hot glass into moulds or onto tables or moulds.

Cat's Eye

a) An imperfection; an elongated bubble containing a piece of foreign matter.

d) A crescent-shaped blister.

Cat Scratch — An imperfection; surface irregularities on glassware resembling the marks of a cat's claws.

Centering — The operation on lens elements wherein the element is optically lined up with the axis of rotation and the edges ground concentric with the optical axis.

Chain Marks — *See* **'Belt Marks'.**

Change Over — *See* **'Reversal'.**

Channel — That part of a forehearth which carries the glass from the tank to the flow spout and in which temperature adjustments are made.

Charge — The glassforming mixture for melting.

Chatter — *See* **'Broken Ring'.**

Check

a) An imperfection; a surface crack in a glass article.

b) A fine, short surface crack caused by contact between hot glass and a cooler surface.

Check Marks — *See* 'Check'.

Checker Bricks — Refractory pieces used for packing a regenerator, also called 'Checker Tiles'.

Checker Tiles — *See* **'Checker Bricks'.**

Checkers

a) The refractory bricks, alternating with openings, in the chambers of a regenerative furnace.

b) The regenerator built in such a fashion.

c) The refractory pieces used in such a fashion.

Chemical Durability — The lasting quality (both physical and chemical) of a glass surface. It is frequently evaluated, after prolonged weathering or storing, in terms of chemical and physical changes in the glass surface, or in terms of changes in the contents of a vessel.

Chemical Glass — A chemically durable glass suitable for use in making laboratory apparatus.

Chicken Boost — *See* **'Birdcage'.**

Chill Mark — A wrinkled surface condition on glassware resulting from uneven cooling in the forming process.

Chip

a) An imperfection due to breakage of a small fragment out of an otherwise regular surface.

b) A small fragment of glass broken from the surface by mechanical action.

Chipped Glass — A glass article with chipped surface produced intentially.

Chipping — The process of removing thin extra glass prior to grinding.

Choke

a) An imperfection consisting of an insufficient opening in the finish and neck of a container.

b) A contriction in the bore.

Chunk Glass — Optical glass obtained in breaking open a pot of transfer glass.

Chunks — Random sizes of glass sheets that are smaller than standard sizes of stocksheets.

Clear Glass — Transparent glass.

Close Graduation — Scale in which the first short line is too close to its adjacent long line in a group (caused by faulty machine setting).

Closed Pot — A pot made with a roof to protect the contents from flames and combustion gases in the furnace and with a mouth for removal of molten glass, also called 'Covered Pot' or 'Hooded Pot'.

Cobalt (CoO) — An industrial term for cobalt oxide.

Colburn Sheet Process — A method of making sheet glass by bending the vertically drawn sheet over a driven roller which determines the rate (definition) of draw.

Colouring Agent — Batch constituent used to give colour to the glass produced.

Colourless Glass — A glass which absorbs negligibly small amount of visible radiation.

Compact — To treat glass in a manner, such as by heat treatment to approach maximum density.

Concave Bottom — Undue concavity of base.

Conditioning Zone — Part of the feeder, away from the furnace wall, where the glass is conditioned at a required working temperature, also called 'Normalizing Zone'.

Conicity — Conical taper of an article which should be cylindrical.

Constriction — *See* **'Choke'.**

Container — General term applied to glass bottles and jars.

Continuous Filament — *See* **'Fibre'.**

Continuous Tank — A glass furnace in which the level of glass remains constant because the feeding of batch continuously replaces the glass withdrawn.

Covex Bottom — Undue convexity of base.

Cooling Down Period

a) The time elapsing after a covered pot is opened before the glass is cool enough to work.

b) Period between fining stage and the removal of the glass from the furnace.

Cooling Rate — *See* **'Setting Rate'.**

Cord

a) An attenuated glassy inclusion possessing optical and other properties differing from those of the surrounding glass.

b) Very obvious and relatively thick thread of glass, sometime standing out from the surface.

Corrosion — Chemical attack of the surface.

Covered Pot — *See* **'Closed Pot'.**

Cracking Off — Breaking off a glass article from the mould, for example, by scratching and then heating.

Crackled — Glassware, the surface of which has been intentionally cracked by water immersion and partially healed by reheating before final shaping.

Crack-Off — The process of severing a glass article by breaking, as by scratching and then by heating.

Crizzle — An imperfection in the form of a multitude of fine surface fractures.

Crookes Glass — A glass having low transmission for ultraviolet light, and containing cerium and other rare earths.

Cross-Fired Furnace — *See* **'Side-Fired Furnace'.**

Crown — The part of a furnace forming the top or roof.

Crown Flint Glass — An optical crown glass bordering on optical flint glass because of the addition of a substantial content of lead oxide and with somewhat higher dispersion than optical crown glass.

Crown Glass

a) A transparent glass made in disc form by blowing and spinning. Crown glass has a natural fire-finished surface but it is of varying thickness with a slight convexity and so gives a marked degree of distortion of vision and reflection.

b) A type of optical glass not containing lead among its constituents and having low dispersion and usually low in refractive index.

Crown Optical Glass — An optical glass with a low dispersion and low index of refraction, usually forming the converging element of an optical system (*see also* **'Optical Crown Glass'**).

Crush — A lightly pitted area resulting in a dull grey appearance over the region.

Crystal Glass — A colourless glass, highly transparent, frequently used for art or table ware.

Cullet

a) A waste or broken glass, usually suitable as an addition to raw batch.

b) Domestic cullet (factory cullet); cullet from within the plant.

c) Foreign cullet; cullet from an outside source.

d) The portion of a glass article that will later be cut off and discarded or remelted.

Cullet Cut — Synonymous with **'Block Reek'.**

Curtain Wall — *See* **'Baffle Wall'.**

Cut Glass — Glassware decorated by grinding figure or patterns on its surface with an abrasive wheel, followed by polishing, also called 'Deep Cut'.

Cut-Off Mark — *See* **'Shearing Mark'.**

Cut Sizes — Any flat glass cut to specific dimensions.

Cutter

a) A worker who cuts flat glass to the required size.

b) A tool used in cutting glass.

c) A workman engaged in grinding designs on glass.

Cutting

a) Scoring flat glass with a diamond or a steel wheel, and breaking it along the scratch.

b) Producing cut glass.

Cycle — In open-pot practice, the time between the first filling of batch and the emptying of the pot.

Cylinder Process — A process for manufacture of window glass wherein molten glass is blown and drawn into the form of a cylinder, which is subsequently split longitudinally, reheated in a flattening kiln, and flattened.

D

Damper — The contrivance which controls the flow of gases.

Danner Process — A mechanical process for continuously. drawing glass cane or tubing from a rotating mandrel.

Day Tank — A periodic melting unit, usually designed to be emptied by each day of hand-gathering.

Dead Plate — In automatic production, a stationery plate receiving a glass article awaiting transfer.

Debiteuse — A slotted, floating clay block through which glass issues in the Fourcault process.

Decolorizer — A substance or mixture of substances added to the batch for counteracting the colouring effect of impurities. Its action is either physical (by imparting the colour complementary to that of the impurity), or chemical (for example, by oxidation).

Decolorizing — The process of producing a colourless appearance in glass.

Decorated — Glass to which a process of decoration has been applied.

Decorating

a) The firing of enamels on glassware.

b) Applying designs to formed glassware by means of etching, sand blasting, cutting, engraving or similar methods.

Decorator — A craftsman who decorates glassware by silk screen, transfer, spraying colour, brush or pallette knife or by cutting, also called 'Engraver'.

Deep Cut — *See* **'Cut Glass'.**

Deformation Point — The temperature observed during the measurement of expansivity by the interferometer method at which viscous flow exactly counteracts thermal expansion. The deformation point generally corresponds to a viscosity in the range from 10^{11} to 10^{12} poises.

Delivery

a) The final act of any glass forming unit on a particular article, consisting of motion to remove the article from the mould.

b) The process or equipment used for directing charges or gobs of glass to a forming machine.

Demi-crystal Glass — *See* **'Crystal Glass'.**

Dense — In optical glass, the sub-class of a higher index of refraction.

Devitrification — Crystallization in glass.

Dice — Approximately cubical fragments formed when toughened glass is broken.

Digs — Deep, short scratches.

Dimming — A whitish surface film being a further stage of bloom; it cannot be removed without damaging the surface.

Direct-Fired Furnace — A melting furnace having neither recuperator nor regenerator.

Dirt — A small particle of foreign matter embedded in the glass surface.

Dirty Finish — A scaly or rough appearance of a finish, sometimes with black spots.

Discoloration — A fault in pulled jets where a whitish or blackish deposit becomes fused into the glass during prolonged heating while drawing.

Dispersion — Variation of refractive index with wave length of light (*see also* **'R-value'** and **'Nu-value'**).

Distortion

a) An optical effect due to variation of thickness of sheet glass.

b) An optical effect due to uneven wall thickness, uneven surfaces or inhomogeneities in the glass.

Distribution — The thickness of the walls of a glass article over its entire area.

Document Glass — An ultraviolet absorbing glass used for protecting documents.

Dog Hole — *See* **'Throat'**.

Dog House — A small box like vertibule on a glass furnace into which the batch is fed or which facilitates the introduction and removal of floaters.

Dolomite — A mineral having the empirical composition, 1 mole of calcium carbonate and 1 mole of magesium carbonate.

Dope — Slang for mould lubricant.

Dope Mark — A dark mark on the surface, being the residue of mould lubricants.

Double-Cavity Mould — A mould possessing two cavities for simultaneous fabrication of two articles of glass.

Double-Cavity Process — Any glass-forming process that uses two charges of glass and forms them simultaneously.

Double-Gob Process — *See* **'Double-Cavity Process'**.

Down Draw — Process of continuously drawing glass tubing downwards from an orifice.

Down Draw Process — A process of continuously drawing glass turning downwards.

Drag Ladle — To produce cullet by ladling glass from the melt into the water.

Dragade — *See* **'Drag Ladle'**.

Dragaded Cullet — *See* **'Quenched Cullet'**.

Draw — The quantity of glass delivered by a furnace in a given time of 24 hours, also called 'Load', 'Output' or 'Pull'.

Draw Bar — A submerged refactory block used to define the position of sheet glass during drawing.

Draw Gang — Group of men employed to cut and handle glass as it comes from the lehr.

Drawn Glass — Glass, usually in sheet form made by a continuously mechanical drawing operation.

Drop Throat — *See* '**Submarine Throat**'.

Droplets — *See* '**Tear Drop**'.

Dropped Throat — A throat, the bottom of which is below the level of the melting end of the tank, also called 'Submerged Throat' or 'Sunken Throat'.

Dropping — Forming of glass by heating in a mould without the use of pressure.

Dry Gage — *See* '**Drag Ladle**'.

Dry Joint — A fragile seal caused by insufficient heating.

Dummy — A mechanical device, operated by the blower's feet, for wetting, raising, opening and closing the paste mould in mouth-blowing operations.

Durability — *See* '**Chemical Durability**' and '**Weathering**'.

E

Edge-Polished — Usually applied to flat glass, the edges of which have been polished after cutting.

Edging — Grinding the edge of flat glass, to a desired shape or size (*see also* '**Centering**').

Eggshell — Excessive thinness of a blown bulb.

Electric Boosting — An auxiliary method of adding heat to the glass in a gas or oil-fired tank by passing electric current through the molten glass.

Embossing — Marking or decorating glassware by raised lettering or devices formed in the mould by blowing or pressing (*see also* '**Acid Embossing**').

Enamel Back — A glass tubing or rod in which an interlayer of opal glass is fused in.

End-Fired Furnace — A furnace with fuel supplied from the end wall.

End-Port Furnace — A furnace with ports for fuel and air in the end wall.

Engraved — Glass upon which a pattern has been incised with abrasive wheel.

Engraver

a) A craftsman who engraves glass-forming moulds with lettering or other devices.

b) *See* '**Decorator**'.

Engraving — The process of carving figures, letters, etc, upon glass by abrasive means.

Etch — To attack the surface of glass with hydrofluoric acid or other agent, generally for marking or decoration.

Etched

a) Treated by etching.

b) Weathered so that surface is roughened.

Etching — Treating the surface of glass with hydrofluoric acid or some other chemical, generally for marking or decoration, also called 'Acid Etching'.

Eye — The opening in the bottom of a pot furnace through which the flame enters.

F

Fade

a) Attack on the surface of glass causing an oily or whitish surface.

b) Decrease in transparency or reflectivity, or colour intensity of glass.

Feathers — An imperfection consisting of clusters of fine seeds caused by dirt or foreign material entering the glass at the time of casting or shaping.

Feeder — A mechanical device for regularly producing and delivering gobs of glass to a forming unit.

Feeder Channel — Refractory channel between the working end of a furnace and the feeder.

Feeder Connection — The opening or surrounding blocks in a furnace well to receive the channel leading to the feeder.

Feeder Gate — A piece of refractory material lowered into the feeder orifice.

Feeder Nose — A refractory block of special shape containing the orifice forming the delivery end of the feeder.

Feeder Opening — *See* **'Feeder Connection'.**

Feeder Plunger — A reciprocating refractory plunger above a feeder orifice.

Feeder Process — *See* **'Gob Process'.**

Fibre — An individual filament made by attenuating molten glass. A continuous filament is a glass fibre of great or indefinite length. A staple fiber is a glass fibre of relatively short length (generally less than 432 mm).

Figured Glass — Flat glass having a pattern on one or both surfaces.

Figured Rolled Glass — A translucent rolled glass having a pattern on one or both surfaces.

Fill — The unit charge of batch into a tank or pot.

Filling — *See* **'Patching'.**

Filling Point — The level up to which a glass bottle has the nominal capacity.

Fin

a) An imperfection caused by entrance of glass into a seam between mould parts during forming.

b) A thin projection on the surface or edge, often produced by penetration of glass into the mould joint.

Fine Annealing — Annealing to an extremely low stress and uniform index of refraction.

Fine Seed — A bubble of size less than 0·2 mm.

Fining — The process by which the molten glass approaches freedom from undissolved gases.

Finish

a) The part of a bottle for holding the cap or closure.

b) Stage in melting process after glass appears free of seeds.

Finisher

a) Person having charge of a furnace during the melting and fining of the glass.

b) The workman who does the final work, such as polishing or putting the handle on foot on a piece of ware.

Fire Cracks — Cracks in ware caused by local temperature shock.

Fire Finish — To make glass surface smooth and glossy by heating usually in a flame, also called 'Fire Polish'.

Fire Over — To allow a melting unit to idle at operating temperature.

Fire Polish — To make glass smooth, rounded, or glossy by heating in a fire.

Fired On — A term used to describe permanent application to the glass surface of enamels, transfers, metallic stains, etc, by heat treatment.

First Side — The surface of plate which is ground and polished first.

Flakes — Fragements of glass from an overblown bulb which become fused to an assembled apparatus.

Flaking — Peeling of a skin from the surface, usually as a result of corrosion and sometimes leaving the glass iridescent.

Flame-Proof Glass — *See* **'Heat Resisting Glass'.**

Flamming — *See* **'Striking'.**

Flanged Bottom — An imperfection; an offset bottom of a bottle.

Flash — *See* **'Fin'.**

Flashing

a) Applying a thin layer of glass to the surface of a glass of a different colour in the forming stage.

b) *See* **'Striking'.**

Flat Drawn Process — A process in which a sheet of glass is drawn from bath of molten glass and is passed between coolers to control thickness.

Flat Glass — A general term covering sheet glass, float glass, and various forms of rolled and plate glass.

Flat Spot — A flat region on a surface which should be curved.

Flatterer's Assistant — *See* **'Pusher'.**

Flatware — Articles having internal depth not exceeding 25 mm, measured from the lowest point to the horizontal plane passing through the overflow point.

Flies — Very small, often superficial cracks arising from internal strain.

Flint Glass

a) A lead-containing glass.

b) Term used by container industry for colourless glass.

Flint Optical Glass — An optical glass containing lead oxide and usually with a high dispersion and high index of refraction.

Float Glass — A form of flat glass produced by reheating the continuous ribbon of glass whilst it floats over a bath of molten metal.

Float Glass Process — A process in which a ribbon of hot glass is floated upon a heated liquid of greater density than that of glass, to produce a transparent glass, the two surfaces of which are flat, parallel and fire polished so that they give clear, undistorted vision and reflection.

Floater — Floating clay shape to skim foreign materials or control their passage in a furnace.

Floater Hole — An opening in a tank through which floaters are placed.

Flow Hole — *See* **'Throat'**.

Flow Line — *See* **'Chill Mark'**.

Flow Process — *See* **'Gob Process'**.

Flour Crown Glass — An optical crown glass containing a substantial quantity of fluorine and having a very low index of refraction and low dispersion.

Flush — *See* **'Fin'**.

Flux — *A substance added to the batch to promote fusion.*

Flux Block — A refractory furnace block used in contact with glass in melting.

Flux Line — The level of the molten glass surface in a tank, also the boundary line between unmelted batch and clear glass in a tank.

Flux Line Block — The top course of refractory blocks, forming the side walls of a tank.

Foam — A layer of bubbles on the surface of molten glass.

Foam Glass — A light weight multi-cellular glass having a homogeneous mass of sealed cells.

Foam Line — Line in tank dividing foam-covered areas from clear area.

Fold — *See* **'Lap'**.

Foodware — Articles produced from glass and glass-ceramic which are intended to be used for the preparation, cooking, serving and storage of food or drinks including packaging ware.

Foot Blower — A device operated by foot for supplying air.

Forehearth — A section of a furnace, in one of several forms, from which glass is taken for forming.

Forming — The shaping of hot glass.

Forming Hood — The chamber of the forming equipment in which glass fibres are formed and collected.

Forming Rolls — Rolls used in forming flat glass.

Fourcault Process — The method of making sheet glass by drawing glass vertically upward through a slotted debiteuse block.

Free-Blown — *See* **'Offhand Glass'**.

Frit — Calcined or partly fused materials which are subsequently melted to glassy stage.

Fritting Zone — *See* **'Soaking Area'**.

Frosted — Surface treated to scatter light to simulate frost.

Frosted Finish — A finish having areas of numerous checks, particularly on the lip, which thus appears frosted.

Frosting — *See* **'Blooming'**.

Fused Silica — *See* **'Quartz Glass'**.

Fusion

a) Joining by heating.
b) Remelting for bead making.
c) *See* **'Melting'**.

G

Gable Wall — The charging end wall of a glass-melting furnace.

Gaffer — Head workman, foreman, or blower of a glass hand shop.

Gall — Layer of molten sulphates floating upon glass in a furnace, also called 'Salt Water'.

Gaseous Inclusions — Elongated bubbles in sheet glass.

Gate — A refractory slab lowered in the forehearth channel for shutting off the flow of glass.

Gather

a) The mass of glass picked up on the blowing iron or punty.
b) To collect glass from a pot or tank at the end of a blowing iron or punty.

Gatherer — A worker who collects molten glass on the end of a blowi iron or punty preparatory to blowing, pressing or drawing.

Georgian — *See* **'Wired Glass'**.

Glass — An inorganic, non-metallic material produced by the complete fusion of raw materials at high temperatures, into a homogeneous liquid which is then cooled to a rigid condition essentially without crystallization.

NOTE — Glass is typically hard and brittle, and has a conchoidal fracture. It may be colourless or coloured, and transparent to opaque. Masses or bodies of glass may be made coloured, translucent, or opaque by the presence of dissolved, amorphous, or crystalline material.

When a specific kind of glass is indicated, such descriptive terms as flint glass, barium glass, and window glass should be used following the basic definition, but the qualifying term is to be used as understood by trader custom.

Objects made of glass are loosely and popularly referred to as glass; such as 'glass' for a tumbler, a barometer, window, a magnificr, or a mirror.

Glass Blower

a) A craftsman who blows hollow-ware on a blowing iron or a semi-automatic machine.

b) *See* **'Bench Worker'** and **'Table Blower'**.

Glass Blowing — The shaping of hot glass by air pressure applied internally.

Glass Ceramic — An inorganic, non-metallic material produced by the complete fusion of raw materials at high temperatures into a homogeneous liquid which is then cooled to a rigid condition with a certain degree of crystallization. It may be translucent or opaque.

Glass Container — General term applied to glass bottles and jars.

Glass Dust — *See* **'Small Glass'**.

Glass Making Sand — *See* **'Sand'**.

Glass Shell (for Lamp) — A protective glass casing for preventing combustion of light emitting element of a lamp and for providing vacuum or gas filled space required for the above element.

Glass Wool — Fleecy mass of plain glass fibres, also called, 'Wool'.

Glazed Pot — A new pot, coated inside with a thin layer of glass to protect it from the attack of raw batch.

Glory Hole — An opening exposing the hot interior of a furnace used to reheat the ware in hand-working.

Gob

a) A portion of hot glass delivered by a feeder.

b) A portion of hot glass gathered on a punty or pipe.

Gob Process — A process whereby glass is delivered to a forming unit in gob form.

Graduated Glassware — Glassware that is marked with one or more graduations for volumetric measuring purposes.

Graduation — The process of marking graduations on glassware.

Ground Glass — Glass roughened by grinding with abrasive materials.

H

Hackle Marks — Fine ridges on the fracture surface of glass, parallel to direction of propagation of the fracture.

Hair Line — *See* '**Air Line**'.

Half-Crystal Glass — *See* '**Crystal Glass**'.

Hang Up — Localized thick section at a point on the internal surface of the body.

Hard Glass

a) Commonly refers to a glass difficult to melt or fuse.
b) A glass of relatively high viscosity at elevated temperatures.
c) A glass of high softening point and low coefficient of expansion.
d) Erroneously used also to describe glass of high chemical resistance.

Hardness — *See* '**Overseal**'.

Head Space — The unfilled space in a glass container fitted with a closure.

Heat Absorbing Glass — Glass having the property of absorbing a substantial percentage of radiant energy in the near infrared of the spectrum.

Heat Proof Glass — A term generally used to describe '**Heat Resisting Glass**'.

Heat Resisting Glass — Glass able to withstand high thermal shock, generally because of low expansion coefficient.

Heat Treated (Glass) — Term sometimes used for tempered glass, *see* '**Tempered Glass**'.

Heavy Bottom

a) Excessive thickness of the bottom of a glass bottle.
b) Excessively thick part of an article.

Heavy Cord — *See* '**Cord**'.

Heavy Corner — *See* '**Heavy Bottom**'.

Heavy Panel — *See* '**Heavy Bottom**'.

Heavy Seed — A group of small bubbles, less than about 0·2 mm, clustered together.

Heavy Shoulders — *See* '**Heavy Bottom**.

Heel Tap

a) An imperfection in which the base or bottom of a bottle is very thick in one area and very thin in another.

b) *See* **'Slugged Bottom'.**

High Alumina Glass — Glass containing substantial (more than 6 percent) amount of aluminium oxide.

High Spots — Local areas of a ground surface which stand proud and prevent perfect mating with a second ground surface.

High Transmission Glass — Glass which transmits an exceptionally high percentage of the visible light.

Hollow Neck — Deficiency of glass in the neck of bottle (*see also* **'Blown Away'**).

Hollows (Stopcocks) — The gradual entry of the side arm bore into the ground barrel creating a pocket.

Hollow-Ware — Articles having an internal depth greater than 25 mm measured from the lowest point to the horizontal plane passing through the overflow point.

NOTE — Hollow-ware may be termed large or small according to its capacity. A ware with a capacity up to 2 litres is termed as small and that with capacity above 2 litres is termed as large hollow-ware.

Hood — *See* **'Potette'.**

Hooked Graduation — A line which turns up or down at one or both ends; a machine fault.

Hot Check — A crack less open than a check; dull in appearance because of the presence of a foreign matter.

Hot End — The manufacturing operations concerned with hot glass, that is, melting, forming, annealing.

Hot Mould — The process of forming glassware in hot uncoated moulds.

Hot Spot — The zone of highest temperature within a glass melting furnace.

I

Ice-Proof — A term used to describe containers (primarily tumblers) able to withstand sudden temperature gradients from the room temperature to that of ice.

Installed Capacity of a Glass Factory — The maximum possible production of finished glassware and is limited by the least capacity of any manufacturing operation in the factory.

Intaglio — A form of decoration in which the depth of cutting is intermediate between deep cutting and engraving.

Interlayer — Term used to describe a plastic layer between the glass sheets, such as for making laminated safety glass, also called 'Interleaf'.

Interleaf — *See* **'Interlayer'.**

Irising — *See* **'Iridescence'.**

Iridescence — Interference colours caused by a slight chemical attack of the surface.

J

Jack Arch — A brick arch above the port arch extending into and supporting the main crown of the tank furnace.

Jack Bricks

a) Bricks used for making the jack arch.
b) Bricks used for stopping round a newly set pot. These bricks have recesses or holes to take a brick fork.

Jamb — Sidewall of port of furnace superstructure carrying port crown load.

Japanese Furnace — Direct coal fired pot furnace.

Japanese Tank — Direct coal fired small tank furnace.

Joint Line

a) *See* **'Parting Line'.**
b) A line or seam on glassware formed at the joint of two mould parts, also called 'Parting Line'.
c) *See* **'Mould Joint'.**

Jointing Yard — Place between the grinding and polishing operations in the continuous manufacture of plate glass, where the plaster joints are remade, sometimes called 'Middle Yard'.

K

Kettle — A hemispherical vessel about one metre in diameter, into which molten glass is ladled.

Knockout — A portion of a piece of pressed ware which has been so designed that it may be knocked out to make a hole.

Knot

a) An imperfection consisting of an inhomogeneity in the form of vitreous lump.
b) A nodular glassy inclusion, often having an attenuated tail.

L

Labelling — *See* **'Badging'**.

Ladle — A long-handled, cup-shaped tool for ladling glass out of or from one pot to another. Also used for filling open pots.

Ladders — *See* **'Washboard'**.

Laminated Glass — A transparent sheet formed from interleaved, firmly adherent layers of glass and plastics material, the latter known as interlayer or interleaf; having glass layers outermost (*see also* **'Safety Glass'**).

Lampblown — Glass articles made, usually from tubing or rod, with the aid of a gasflame.

Lamp Worker — *See* **'Bench Worker'**.

Lamp Working — Forming glass articles from tubing and cane by heating in a gas flame.

Lap

- a) An imperfection; a fold in the surface of a glass article caused by incorrect flow during forming.
- b) A tool used for polishing glass.

Layer — Person who has charge of laying the rough glass in plaster on the grinding and polishing tables.

Laying Yard — Place where the rough glass is laid on grinding and polishing tables with plaster.

Lead Barium Crown Glass — *See* **'Crown Flint Glass'**.

Lead Crown Glass — Optical glass intermediate in lead content and dispersion between crown and flint, also called 'Crown Flint Glass'.

Lead Glass — Glass containing a substantial proportion of lead oxide (PbO) (usually more than 15 percent).

Leaded Glass — Pieces of glass fixed together with strip of lead of 'H' or 'U' section to form a window.

Leaner — An article which leans instead of standing upright when stood on its base.

Lehr — A long, tunnel-shaped oven for annealing glass by continuous passage.

Lehr Loader — A device for properly placing and spacing glass articles on a continuous lehr belt.

Lens — *See* **'Bull's' Eye.**

Lens-Fronted Tubing — Thermometer tubing formed so that the apparent width of the column of mercury or spirit thermometric liquid is magnified.

Light — In optical glass, the subclass of a lower index of refraction.

Light Bottom

a) Deficient thickness of the bottom of a glass container.

b) Excessively thin part of an article.

Light Corner — *See* **'Light Bottom'.**

Light Panel — *See* **'Light Bottom'.**

Light Shoulder — *See* **'Light Bottom'.**

Lime — Calcium oxide (CaO), or a mixture of calcium oxide (CaO) and magnesium oxide (MgO).

Lime Crown Glass — An optical crown glass containing a substantial quantity of calcium oxide.

Lime Glass — A glass containing a substantial proportion of lime, usually associated with soda and silica.

Lime Stone — Either calcitic limestone ($CaCO_3$) or dolomitic limestone ($CaCO_3 . MgCO_3$).

Lines — Fine cords or strings, usually on the surface of sheet glass.

Liquidus Temperature — The maximum temperature at which equilibrium exists between the molten glass and its primary crystalline phase.

Load — *See* **'Pull'.**

Locking Ring — Part of the finish of a container for securing a closure in position.

Long Glass — A comparative term signifying a slow-setting glass.

Lubricant — A solution which, when applied to glass fibres, facilitates their handling by reducing mutual abrasion (*see also* **'Mould Lubricant'**).

M

Main Arch — *See* **'Crown'.**

Mandrel — Refractory tube used in the manufacture of glass tubing or rod.

Manganese

a) Commercial manganese dioxide (MnO_2).

b) An industrial name for pyrolusite.

Mantle Block — Refractory block fitting in the gable wall, over the dog house.

Marbles — Spherical balls of glass.

Marver

a) A flat plate on which a hand gather of glass is rolled, shaped, and cooled.

b) Also the process of doing same.

Mat — A glass-fibre product of felt like nature.

Match Mark — *See* '**Mould Joint**'.

Matt Finish — A kind of rought finish deliberately obtained for decorative purposes.

Mechanical Boy — A foot operated device for manipulating the opening and closing the mould during blowing.

Melt — A specific quantity of glass made at one time.

Melter

a) The chamber of a tank furnace where the glass batch is melted.

b) Person in charge of the furnace during the early stages of filling and melting of batch.

Melting — The thermal process by which the charge is completely converted into molten glass free from undissolved batch.

Melting Area — The area of a furnace under fire. Usually the area up to the bridgewall or floater.

Melting End — The chamber of a tank furnace where glass is melted and refined.

Melting Temperature — The range of furnace temperature within which melting takes place at an economically desirable rate, and at which the resulting glass generally has a viscosity of $10^{1.5}$ to $10^{2.5}$ poises. For purposes of comparing melting temperature of glasses, it is assumed that the glass at its melting temperature has a viscosity of 10^{2} poises.

Meniscus — *See* '**Onion**'.

Metal — Molten glass in a melting unit.

Metal Line — The surface line of the metal or glass in a tank furnace or pot.

Mg Point — *See* '**Deformation Point**'.

Micro Glass — Very thin glass used for microscope cover slips.

Milkiness

a) A condition of pronounced opalescence in glass.

b) A white surface layer caused by volatilization of certain constituents or by devitrification during lamp working.

Millefiori — A form of decoration used, for example, in paper weights, in which sections of multi-coloured glass canes are set in a clear glass matrix to form a design.

Mirror — A general term covering a flat or curved specially treated glass having on one of its sides a thin coating of silver or other metal deposited by chemical or other suitable processes, to provide a reflecting surface. The coated surface may be provided with protective coating(s).

Mixing Room — *See* **'Batch House'**.

Moil

a) The glass remaining on a punty or blowing iron after the gather has been cut off or after a piece of ware has been blown and severed.

b) The glass originally in contact with the blowing mechanism or head, which becomes cullet after the desired article is severed from it.

Moonstone Glass — A type of opal glass resembling the mineral moonstone.

Mosaic — Small glass pieces cemented together, usually on to a flat backing surface to form designs.

Mould — A form (usually metal) in which glass is shaped.

Moulded Glass — Glass that is formed in a mould as distinct from cast, rolled, drawn, or offhand ware.

Mould Joint — Small flange or rim formed on the surface of the glass along the joint of two parts of the mould.

Mould Lubricant — A substance applied on or into moulds to reduce friction or prevent adhesion.

Mould Mark

a) A mark or seam on glassware resulting from a mould joint.

b) A mark on the external suface caused by an irregularity or roughness on the surface of the mould (*see* **'Mould Joint'**).

Mould Pull — A sharp line on the exterior surface caused by variation in the degree of adhesion to the mould.

Mouth Blowing — Shaping hot glass by air pressure applied with the mouth.

Mud-Up — To seal a pot stopper or a joint in a furnace or in a producer gas line, by the application of wet clay.

Muffle — An enclosure in a furnace protecting the ware from the flame and products of combustion.

Murgatroyd Belt — Portion of the sidewall of a bottle near the bottom.

N

n, n_D Line — Abbreviation for index of refraction, generally used with a subscript indicating the special line, for example, n_D = index of refraction for D or sodium line.

Neck

a) Part of a bottle between finish and shoulder.

b) The structure connecting the melting and working chambers of a tank furnace.

c) The structure connecting the uptake and port in a tank furnace.

Neck Ring — A metal part used to form the finish of a hollow glass ware.

Needle — The vertical, reciprocating, refractory part of a feeder which alternately forces the glass through the orifice and pulls it up after shearing, also called 'Plunger'.

Neutral Glass — A glass of high chemical durability.

Normalizing — *See* **'Conditioning Zone'.**

Nose — The working end or refining chamber of a tank.

Notch — A hole left by a chip.

Nu Value — Expressed by the Greek letter or by the English letter 'V'. Designates reciprocal dispersive power as follows:

$$\text{Nu-value} = (n_D - 1)/(n_F - n_C)$$

O

Observations Hole — A small opening in a furnace wall through which observations may be made, also called 'Peep Hole', 'Bye Hole' or 'Sight Hole'.

Obsidian — A highly siliceous natural glass.

Offhand Glass — Glass produced by the offhand process.

Offhand Process — The process of forming glassware by an expert, working without the aid of moulds.

Offset — An imperfection resulting from mould parts not properly matched, that is, a finish or base offset from body or neck.

Offset Finish — A finish which is unsymmetrical about the centre axis of the neck of a bottle.

Offset Finish (Horizontally) — A finish which is not correctly centred relative to the vertical axis of the neck.

Offset Finish (Vertically) — A finish the havles of which are displaced vertically relative to each other.

Offset Punt — A base which is unsymmetrical about the centre axis of a bottle.

Oil Mark — Small, very obvious mark looking like a feather; due to vapours produced by evaporation of oil.

Onion — A term sometimes used for the bulblike mass of a glass at the origin of the drawn sheet in the Furcault process.

Opacifier — A mineral or chemical compound added to the batch to produce opal glass.

Opal Glass — Glass with fiery translucence. Loosely, any translucent glass.

Open Pot — A pot open to the flames and gases of combustion.

Open Seed — A seed which has burst or opened leaving a cavity in the finished surface.

Ophthalmic Glass — Glass used in spectacles, generally having specified optical and physical properties and quality.

Optic

a) Having variations in wall thickness, producing refractive effects.

b) A lens or prism in an optical instrument.

Optical Blanks — Optical glass formed by pressing into the rough shape and side required in the finished article, also called 'Optical Pressings'.

Optical Borate Flint — Optical flint glass consisting essentially of boric oxide (B_2O_3) and lead oxide (PbO).

Optical Crown Glass — An optical glass with a low dispersion and low index of refraction, usually forming the converging element of an optical system. Any optical glass possessing a nu-value of at least 55·0; or any optical glass with a nu-value between 50·0 and 55·0 having a refractive index greater than 1·60.

Optical Glass — Glass of high quality having closely specified optical properties, used in the manufacture of optical systems.

Optical Glass Numerical Designation — The numerical designation in common usage is based on the index of refraction for medium (n_D) and the nu-value (v). The unity factor for the index is dropped (that is, 1·496 becomes 496), and the decimal point for the nu-value is also dropped (nu = 64·4 becomes 644). Thus, the glass is specified 496/644 without reference to chemical composition. In some cases, it is permissible to precede the numerical designation by the abbreviated name indicative of composition. For instance, Borosilicate Crown (BSC) 496/644 may be used. For example, Dense Barium Crown may be crown 610/574 or DBC 6 10/574, or just 610/574 meaning n_D = 1·610 and nu-value = 57·4.

Optical Pressing — *See* **'Optical Blanks'.**

Optical Zinc Crown — Optical crown glass containing a substantial proportion of zinc oxide (ZnO).

Orange Peel — Numerous small regular defects giving the surface the appearance of orange peel.

Orifice — An opening through which glass flows, also called 'Orifice Ring' or 'Bush'. In a feeder, the term refers to the opening formed by an orifice ring in the bottom of the spout.

Out-of-Flatness — Deviation from the intended form.

Out-of-Round

a) The imperfection of nonroundness in glass articles.

b) *See* **'Out-of Flatness'.**

Out-of-Shape — *See* **'Out-of Flatness'.**

Out-of-Square End — End of tubing not perpendicular to the axis.

Output — *See* **'Draw'.**

Ovality — Deviation of a cylindrical or spherical glass article from circular towards an elliptical cross-section.

Oven-Glass

a) Glass suitable for manufacture of articles to be used in baking and roasting foods.

b) Glassware made from oven glass.

Overflush — An excess of glass round the joint line of the finish or the flange of a glass article.

Overlap — A fault in a ring graduation line where the line is scribed more than 360° and the overlapping section is thickened or doubled.

Overpress — An imperfection consisting of the projecting excess glass resulting from imperfect closing of mould joints.

Overseal — The result of over-heating a sintered disc during sealing which reduces the porous area.

Owens Process — A bottle making process in which the blank or parison mould is filled by suction.

Oxidizing Agent — A compound that decomposes during the melting or fining stages supplying oxygen to other batch chemicals.

P

Pack

a) The quality of ware packed.

b) The ratio of packed ware to theoretical.

Paddling — The rough shaping of a piece of glass in a furnace by means of paddles or tools preparatory to the pressing operation for making optical glass blanks.

Parison — A preliminary shape or blank from which a glass article is to be formed.

Parison Mould — *See* '**Blank Mould**'.

Parting Line — Line or seam on glassware resulting from joint of two mould parts.

Paste Mould — A mould lined with adherent carbon, used wet for blown ware.

Patching — Placing of a refractory block outside a badly worn block while the furnace is operating, or a block so placed, also called 'Filling'.

Pearl Ash — Commercial potassium carbonate.

Peephole — A small opening in a furnace wall for observation purposes.

Phosphate Crown Glass — An optical crown glass containing a substantial quantity of phosphorous pentoxide (P_2O_5).

Phosphate Glass — A glass in which the essential glass former is phosphorous pentoxide instead of silica.

Pig — A rest for blowpipe or punty during the gathering operation.

Pilkington Process — A process for making flat glass in which the glass continuously pours from a tank into a spout and then between forming rolls and is subsequently annealed as one continuous sheet.

Pillar Arches — The arches spanning the pillars of a pot furnace.

Pillar Block — Columns supporting the crown of a pot furnace between which the pots are set.

Pin Hole — A minute hole.

Pip — A local smooth lump or thickening in a rim or bead. Results from the glass-cutting method.

Pipe — *See* **'Blow Pipe'**.

Pipe Blister — A large bubble on the inside surface of a glass article often arising from dirt or scale on the blowpipe.

Pit — A notch produced during grinding or sandblasting.

Pitch Polishing — Polishing operation in which pitch rather than felt is the resilient carrier for the polishing agent.

Pittsburgh Sheet Process — The method of making sheet glass by drawing vertically upward from a free bath surface wherein definition of draw is established by a submerged refractory member.

Plain — Relatively free from bubbles and seed during the melting process.

Plain Glass — Glass free from seed or bubbles.

Plaining — *See* **'Refining'**.

Plaster — Partially dehydrated gypsum used with water for welding plate glass to tables during the grinding and polishing of plate glass.

Plate Glass — Flat glass formed by a rolling process, ground and polished on both sides, with surfaces essentially plane and parallel.

Plug — The reciprocating metal part which forces glass into the contours of a mould, or which, in a blank mould forms the initial cavity for subsequent blowing (*see also* **'Needle'**).

Plunger Pull — A protuberance on the internal surface caused by glass sticking to the plunger.

Plunger Tip — *See* **'Plug'**.

Ply — Glassware having a layer of opal glass covered on one or both sides with coloured or colourless transparent glass, normally used for illuminated globes and lighting shades.

Pock Mark — Surface roughness, produced by very small protrusions.

Poling — *See* **'Blocking'**.

Polished Plate Glass — *See* **'Plate Glass'**.

Pontil — *See* **'Punty'**.

Port — Any opening in a furnace through which fuel or flame enters or exhaust gases escape.

Port Tongue — Refractory structure inside the port to prevent early mixing of fuel gas and air in the port.

Pot — A one-piece refractory container for melting glass, Open pot; a pot wherein the glass surface is not protected from the furnace atmosphere. Closed pot; a pot having a crown protecting the glass from the furnace atmosphere.

Pot Arch — A furnace for firing or preheating a pot.

Pot Furnace — A furnace for melting glass in pots.

Pot Glass

a) Glass melted in a pot as distinct from a tank.

b) Glass suitable for pot melting.

Pot Opening — The opening between the pillars of a pot furnace.

Pot Ring — *See* **'Ring'.**

Pot Setting — Placing a pot in position in a pot furnace.

Pot Spout — A channel block connecting the working end of a tank furnace with a revolving pot.

Pot Wagon — A vehicle used for transferring a pot from a pot arch to a pot furnace.

Potash — Potassium oxide (K_2O). Loosely, a carbonate of potassium.

Potette — A refractory shape introduced into a furnace and partly immersed in the glass to protect the gathering point from the furnace gases; also called 'Hood'. It is used for hand gathering and also for certain suction machines.

Powder Blue — A prepared, finely ground pigment containing cobalt oxide (CoO) added to the batch as a physical decolorizer.

Press and Blow Process — A process of glass manufacture in which the finish and parison are pressed and the parison is subsequently blown to form the final shape.

Pressed Glass — Glassware formed by pressure between a mould and a plunger.

Pressing — The operation of forming pressed glass.

Pressings — *See* **'Blanks'.**

Pressure Check

a) An imperfection; a check or crack in a glass article resulting from too much pressure in forming.

b) A fine, unobtrusive check caused by excess pressure during forming or by second contact with the mould.

Prismatic — Translucent rolled glass, one surface of which consists of parallel prisms made in three designs giving three different nominal angles of refraction to a beam of light passing through the glass.

Proof — *See* **'Rod Proof'.**

Pull — The quantity of glass delivered by a furnace in a given time, usually 24 hours.

Punch Ware — Handmade, thin, blown glassware, especially tumblers.

Punty

a) A gathering iron of solid cross-section.

b) A device to which ware is attached for holding during fire polishing or finishing.

Pusher — A worker who pushes glass into the kiln after flattening, also called 'Flattener's Assistant'.

Q

Quarl Block — *See* **'Burner Block'.**

Quartz Glass — A term applied to silica glass made by fusing vein quartz.

Quenched Cullet — Cullet made by running molten glass into water, also called 'Dragaded Cullet' or 'Dragladled Cullet'.

R

R-Value — The partial dispersion ratio given by the following equation:

$$\text{R-Value} = (n_D - n_C)/(n_f - n_C)$$

Rack Mark — A surface imperfection in rolled glasses due to faulty gearing in the forming roller drive.

Raw Batch — A glass charge without cullet.

Raw Cullet — A glass charge made totally of cullet.

Ream — An imperfection consisting of nonhomogeneous layers or strings in flat glass.

Reboil — Reappearance of bubbles in molten glass after it had previously appeared free of undissolved gases.

Recuperative Furnace — A furnace having a recuperator.

Recuperator — A continuous heat exchanger in which heat is conducted from the products of combustion to incoming air through flue walls.

Red Edge — Numerous rouge pits located around the edges of a large sheet of polished plate glass.

Reducing Agent — A chemical that, at high temperature, lowers the state of oxidation of other batch chemicals.

Refill (of Vacuum Flask) — A double walled glass container, with the walls silvered and the space in between maintained under vacuum to reduce to a minimum the transfer of heat to and from the contents placed on it.

Refiner — A compartment of a glass tank furnace, for the purpose of conditioning the glass (*see also* '**Nose**').

Refining — The stage in the melting process of glass at which the undissolved gases are removed from molten glass, also called 'fining' or 'plaining'.

Refining Agent — A chemical which promotes refining of glass, also called 'Plaining Agent'.

Reflector — A prismatic glass which reflects light.

Refractor — A prismatic glass which refracts light.

Refractory Stone — A fragment of refractory material coming from the furnace or pot in which the glass was melted.

Regenerative Furnace — A furnace having regenerators.

Regenerator — A cyclic heat interchanger that alternatively receives heat from gaseous combustion products and transfers heat to air or gas before combustion.

Remoulding — A process in which optical glass is preheated and pressed into lens blanks.

Reversal — A periodic operation of reversing the direction of firing in a regenerative furnace, also called 'Change-Over'.

Reverse — To reverse the direction of flow of gas and air in a regenerative furnace.

Revolving Pot — A rotating circular container from which the Owens machine gathers glass.

Revolving Tube — A hollow cylinder, concentric with the needle of a feeder, revolving in the glass.

Ribben — A continuous strip of glass in the process of making.

Ribbon Process — A process whereby molten glass is delivered to a forming unit in a ribbon form.

Rib Marks — Characteristic arc-shaped lines on a fractured surface of glass indicating the direction of fracture travel.

Rider Arch — One of a series of arches that support the checkerwork in a regenerator.

Ring

a) A floating refractory body surrounding a glass surface from which gathers are made.

b) A mould part that forms the rim of a pressed article.

Ring Section — Narrow, peripheral section cut from a glass article for optical examination.

Ringhole — An opening in a tank through which glass is gathered.

Rock (Blownware) — Deformation of a base so that an article does not stand firmly on a flat surface.

Rock (Ground Surface) — Excessive play between ground surfaces.

Rock Crystal

a) Transparent quartz.

b) Highly polished blown glassware, handcut or engraved.

Rocker—An imperfection — A bottle with bottom deformed so that it does not stand solidly (rocks).

Rocker Bottom

a) *See* **'Rocker'**.

b) *See* **'Rock'**.

Rod Proof — A test specimen taken from the melt on an iron rod.

Rolled Glass

a) Optical glass formed by rolling into plates at the time of manufacture, as distinguished from transfer glass.

b) Flat glass formed by rolling.

Roller — A blown cylinder for making window glass by the nearly absolete hand process.

Roller Mark — An imperfection in the surface of sheet glass due to contact with the rollers in the tower of a flat glass drawing machine, also called 'Roller Scratch'.

Roller Scratch — *See* **'Roller Mark'.**

Rolling Process — A process for making plate glass in which it is formed between rollers.

Rouge Pits — An imperfection consisting of traces of rouge remaining in an incompletely polished glass surface.

Rough Cast — Flat glass, one surface of which has a definite texture, made by rolling molten glass either on a plate or between rollers.

Rough Glass — A glass obtained by cutting the original sheet of rolled glass into workable sizes.

Rough Grinding — Producing a coarse ground surface on flat glass or glassware, also called 'Roughing' or 'Rough Polishing'.

Roughing — *See* **'Rough Grinding'.**

Rough Polishing — *See* **'Rough Grinding'.**

Round Table — A type of laying table used for supporting plate glass for grinding and polishing, now largely superseded by the continuous system.

Rubber Cut — An imperfection in plate glass resulting from rupture of the surface by the runner bar.

Rubs — Abrasion of glass surfaces producing a frosted appearance. A 'rub' differs from a 'scratch' in having appreciable width.

Run Back — Deformation due to glass movement after the plunger is raised.

Runner Bar — Iron casting attached to a circular grinding runner or head for abrasive grindong of plate glass.

Running Batch — The regular batch formulated to produce the desired composition when used with its own cullet.

S

Safety Glass — Glass so constructed, treated, or combined with other materials, as to reduce, in comparison with ordinary sheet, float or plate glass, the likelihood of injury to persons by objects from exterior sources or by these safety glasses when they may be cracked or broken.

Type of Safety Glass include:

a) **Laminated Safety Glass** — Two or more pieces of glass held together by an intervening layer or layers of plastics materials. It will crack and break under sufficient impact, but the pieces of glass tend to adhere to the plastic and not to fly. If a hole is produced, the edges are likely to be less jagged then would be the case with ordinary glass.

b) **Tempered (Toughened) Safety Glass** — A single piece of specially heat treated glass, with a stress pattern such that the piece when fractured reduces to numerous granular fragments, with no large jagged edges.

c) **Wired Safety Glass** — A single piece of glass with a layer of meshed wire completely imbeded in the glass, but not necessarily in the centre of the sheet. When the glass is broken, the wire mesh holds the pieces together to a considerable extent.

Sagging — Process of forming glass by reheating until it conforms to the shape of the mould or form on which it rests.

Salt Petre — Commercial potassium nitrate (KNO_3).

Salt Water — Molten sulphates floating on the surface in a glass melting unit (*see also* **'Gall'**).

Sand — A source of silica for the glass batch, also called 'Glass Making Sand'.

Sand Blasting — Producing a matt surface on glass by projecting on to the surface a jet of small abrasive particles at high velocity.

Sand Holes — Small fractures in the surface of glass, produced by the rough grinding operation, which have not been removed by subsequent fine grinding.

Scale — Flakes of metal oxide or graphite included in the glass or stuck to the surface during forming.

Scar — *See* **'Shear Mark'**.

Schellback Tubing — Tubing generally used for burettes and thermometer having an opal backing with a central blue line to facilitate reading of graduation marks.

Score Marks — Lines round a barrel or key caused by excessive turning of the key with a high spot or foreign body present.

Scratch — A deep score mark, or tearing of the surface, in the course of manufacturing or handling, appearing as though made by a hard rough or sharp body.

Scrub Marks — *See* **'Brush Marks (b)'**.

Scuff — An area covered by fine scratches, usually due to abrasion of one piece of glass against another.

Scum — A floating layer of unmelted material on the molten glass surface.

Sealing — *See* **'Fusion'**.

Sealing Surface — The portion of the finish which makes contact with the sealing gasket or liner (*see also* **'Finish'**).

Seam

a) Mark on glass surface resulting from joint of matching mould parts.

b) To slightly grind the sharp edges of a piece of glass.

Seat — Prepared position on the siege where the pot rests.

Second Side — The final side of a plate glass to be ground and polished.

Seed — An extremely small gaseous inclusion in glass not more than 0·5 mm in any direction, measured by the average of the maximum and minimum dimensions.

Selenium — Selenium metal used as a decolorizer and also as a colouring agent in glass batch.

Selvedge — The edge of a ribbon of rolled glass which is automatically formed during manufacture.

Semi-Crystal Glass — *See* **'Crystal Glass'.**

Setting Rate — A comparative term referring to the time required for the glass surface to cool through the working range. A short time implies a fast setting rate and a long time implies a slow setting rate.

Settle Mark

a) *See* **'Chill Mark'.**

b) Annular thickening of the container wall, generally in the lower third.

Settle Wave — *See* **'Settle Mark'.**

Shadow Wall — A more or less solid structure built on the top of the bridgewall or suspended from the crown to limit the flow of heat from the melter to the refiner.

Shapping Block — A piece of wood used in shaping the glass on the blowing iron before blowing in the mould.

Sharp Finish

a) Rough finish with sharp edges.

b) A rough finish with sharp edges left on glass which has been cut.

Sharp Fire — Combustion with excess air and short flame.

Shear Cake — A counter weighted refractory slab used as a gate or door to a small furnace or oven.

Shear Mark — A scar appearing in glassware, caused by the cooling action of the cutting shear.

Sheet Glass — Flat glass made by continuous drawing.

Shell — *See* **'Chip'**.

Shoe — A clay vessel, in the shape of a crucible, laid horizontally at the side of the pot mouth for heating the ends of blowing irons.

Shop

a) A unit group of workmen producing glassware; and
b) Also, its location at the furnace.

Short — A comparative term signifying a fast setting glass.

Short Finish — An imperfection in plate glass, resulting from incomplete polishing.

Shoulder — The curved surface between the walls and the neck of a bottle or other container.

Shread — The process of making cullet by running molten glass into a water stream.

Side Block — Refractory blocks forming the sides of a tank furnace in contact with glass.

Side-Fired Furnace — A furnace with fuel supplied from the sides (*see also* **'Cross-Fired Furnace'**).

Side-Port Furnace — A furnace with ports on the sides.

Siding — Variation in wall thickness at a given cross-section, usually a result of eccentricity of the internal section.

Siege — Floor of a pot furnace, often called 'Bench'.

Sight Hole — *See* **'Observation Hole'**.

Signal Glass — Glasses in the shape of roundels or lenses used for signalling purposes, for example, in the railways, aviation, etc.

Silica Glass — Vitreous silicon dioxide (SiO_2); quartz glass; pure silicon dioxide (SiO_2) glass.

Silk Screen Process — A decorating process in which a design is printed on glass through a silk mesh, woven wire, or similar screen.

Silvering — The application by chemical methods of a film of silver to a glass surface.

Sintered Glass — Porous glass made for filtration or other purposes by heating graded glass powder.

Skewbacks — Specially shaped blocks forming a furnace crown or other arch.

Skimmer — A worker who skims surface metal from a tank or pot furnace.

Skin Blister — A thick, often elongated, blister on or near a glass surface.

Skin Cracks — *See* **'Crizzle'**.

Skittle Pot — A pot for melting small quantities of glass in a furnace containing pots otherwise of normal size.

Skylight — A very poor quality of plate glass.

Slab Glass — Optical glass obtained by cutting or forming the chunk glass into plates or slabs.

Slag — Partially fused mixture of spilled batch, overflowed glass, breeze coal, and clay from the siege.

Slag Glass — Glass in which slag is the principal constituent of a batch.

Slanting Line — A graduating fault in which the plane of the line is not at right angles to the axis of the workpiece.

Sleek — An imperfection; a fine scratch like mark having smooth boundaries, usually produced by a foreign particle in the polishing operation.

Sliver — Bundles of noncontinuous or shortlength fibres that have reached that stage of their fabrication into yarn wherein they are parallel and overlapping and have no twist.

Slug

a) Any nonfibrous glass in a glass-fibre product.
b) A thick part, due to an excess of glass at a point on the internal surface.

Slugged Bottom — An imperfection; very heavy glass on one side and very light on the opposite side of the bottom of a bottle or container (*see also* **'Heel Tap'**).

Small Glass — Small particles of glass adhering to the interior surface.

Smear — A check, especially on the neck finish.

Smoke — Streaked areas appearing as slight discoloration.

Smoked

a) A term applied to the discolouring of glass in a reducing flame.
b) Glass covered with smoky film from open-fired lehrs.

Smooth — Finely ground, as applied to a flat glass surface, prior to polishing.

Snake, Snaking

a) Progressive longitudinal cracking in continuous flat glass operation.

b) Variation in width of sheet during the sheet glass drawing process.

Snap — A device for gripping a piece of formed glass for fire polishing and finishing.

Soaking Area — The area between the gablewall and the first pair of ports in a cross-fired tank furnace also called 'Fritting Zone'.

Soaking Pit — A conditioning furnace used to bring the glass in open pots to a uniform temperature for casting.

Soda

a) Sodium oxide (Na_2O).

b) Commercial anhydrous sodium carbonate (Na_2CO_3).

Soda Ash — *See* **'Soda'**.

Soda-Lime Glass (Soda-Lime-Silica Glass) — A glass in which the main constituents are normally silica, lime and soda; also called 'Lime-Soda Glass'.

Soft Fire — A flame with a deficiency of air.

Soft Glass

a) Glass with relatively low softening point.

b) Glass having a low resistance to weathering.

Softening Point — The temperature at which a uniform rod 0·55 to 0·75 mm in diameter and 23·5 mm in length, elongates under its own weight at a rate of one millimetre per minute when the upper 10 cm of its length is heated in a prescribed manner at a rate of approximately 5°C per minute. For glass of density near 2·5 g/cm^3, this temperature corresponds to a viscosity of $10^{7.6}$ poises.

Softness — Friability, or liability to crumbling, caused by underfiring a sintered disk.

Solarization — Change in transmission of glass as a result of exposure to sunlight or other radiation in or near visible spectrum.

Soluble Glass — Silicate of soda or potash, also called 'Water Glass'.

Spalling — Breaking off of small fragments caused by internal stress of thermal or mechanical origin.

Spectacle Crown — A type of crown glass used specially for making spectable lenses and usually of refractive index 1·52.

Spider

a) A wheel-like casting consisting of a rim and radial spokes on which are mounted felt polishing pads.

b) Assembly of radiating tie rode on the top of a furnace.

Spider Web — Water soluble crystals produced by chemical attack and forming patterns resembling spider web.

Spike — A pointed protuberance, particularly on the inside of the base.

Spiral Fracture — A crack which propagates in a spiral (helical) path along a tube.

Split

a) An imperfection; crack or check going from surface to surface of a glass article.

b) A crack which penetrates from one surface to another either through the thickness or at an edge.

Spoon Proof — Test ladle specimen taken during various stages of melting and fining.

Spout — The part of a feeder that carries the orifice, revolving tube, needle, etc.

Spreading — The irregular thickening of a line in which the etchant penetrates the resist.

Spun Glass — *See* 'Fibre'.

Square-Cut Glass — Optical glass cut in small squares, separated and designated by weight.

Stability

a) Resistance to devitrification.

b) Chemical durability, resistance to weathering.

Stabilized Glass

a) Glass heat-treated in such a way that it is in an equilibrium state corresponding to some particular temperature.

b) Glass articles, for example, thermometers, heat-treated so that they suffer no permanent change of dimensions or properties over a particular range of temperature.

c) Glass resistance to darkening by high energy short-wave radiation (Radiation Stabilized).

Stacker — *See* '**Lehr Loader**'.

Stain

a) An imperfection consisting of chemical corrosion of glass.
b) Colour applied to glass by absorption at an elevated temperature.

Stained Glass

a) Glass coloured by fusing pigments to the surface.
b) Windows made of pieces of stained glass, or of coloured sheet.

Stapler Fibre — *See* '**Fibre**'.

Star Crack — *See* '**Bruise**'.

Stemware — General description of stemmed glass drinking vessels.

Stepped Line — *See* '**Stepping Out**'.

Stepping Out — A dislocation in a line resembling the cross-section of a step.

Sting Out — Combustion gases or flames issuing from openings in furnace walls due to positive internal pressure.

Stone — An imperfection comprising crystalline contamination in glass.

Stopper — A refractory piece shaped to fit a channel and used for controlling the flow of glass into a revolving pot of a suction machine, also called 'Gate'.

Straight Throat — A throat at the same level as the bottom of the melting end of the tank.

Strain — Elastic deformation due to stress.

Strain Disc — A disk of glass having a calibrated amount of birefringence at a specified location, and used as a comparative measure of the degree of stress.

Strain Point — The temperature at which the internal stress is removed in about 16 hours. It corresponds to the equilibrium temperature at which the glass has a viscosity of $4{\cdot}0 \times 10^{14}$ poises.

Strand — A multiplicity of continuous glass filaments combined in a single compact unit, without twist.

Streak

a) Dark or differently coloured inclusion of linear form in colourless or coloured glass.
b) A thread of glass differing in colour from the surrounding glass.

Strength

a) A term to indicate relative thickness in sheet glass.

b) Tensile strength of glass.

Stress — Any condition of tension or compression existing within the glass, particularly due to incomplete annealing, temperature gradient, or inhomogeneity.

Striai

a) A cord of low intensity generally of interest only in optical glass (*see also* **'Cord'**).

b) Glassy threads or veins finer than cord.

Striking — Development of colour or opacity during cooling or reheating, also called 'Flaming' or 'Flashing'.

Strings — Transparent lines appearing as though a thread of glass has been incorporated into the glass.

Stringy Knot — A stone surrounded by an envelope of glass, produced by dissolving of the stone, and generally having a tail of cord.

Stripping Yard — The place where glass plates are removed from table after grinding and polishing.

Structural Glass

a) Flat glass, usually coloured or opaque, and frequently ground and polished, used for structural purposes.

b) Glass block, usually hollow, used for structural purposes.

Submarine Throat — A throat with level below the bottom of melter.

Submerged Throat

a) *See* **'Dropped Throat'**.

b) A throat will level below the bottom of melter, also called 'Submarine throat'.

Substance — The thickness of sheet or rolled glass.

Suck and Blow Process — A process of glass forming in which glass is sucked into a parison mould, and then blown to its final shape in a blow mould.

Suction Process — Any process where glass is gathered by vacuum into the mould.

Sulphur Stain — A surface defect in sheet glass, in the form of streaky lines or multicoloured blemishes caused by sulphur dioxide, if present in furnace atmosphere.

Sump Throat — *See* **'Submarine Throat'**.

Sunken Sides — An article with sides bulged inwards.

Sunken Throat — *See* **'Dropped Throat'**.

Super Structure — All the parts of a tank furnace above the side blocks.

Surface Blows — Air inclusions on the outer surface (particularly in petri-dishes), leaving small sharply defined impressions.

Surface Polishing — Further polishing of plate glass to remove slight defects.

Suspended Arch — An arch in a furnace which is suspended independent of the side or jamb walls.

Sweet — A term applied to easily workable glass having a long working range.

T

Table Blower — *See* **'Bench Worker Glass Blower'**.

Take-Out — A mechanical device for removing a finished article from any glass-forming unit.

Taker-In — An operator who takes hot glassware from the forming machine, glass blower or presser to the lehr for annealing.

Taker-Out — A worker who removes glassware from the forming mould for collection by the 'Taker-in'.

Taking Down Period — *See* **'Cooling Down Period (b)'**.

Tank — A melting unit, in which the container for molten glass is constructed from refractory blocks, also called 'Tank Furnace'.

Tank Block — A refractory block used in the construction of a tank compartment of a glass-melting furnace.

Tank Furnace — *See* **'Tank'**.

Tank Glass

a) Glass melted in a tank as distinct from a pot.
b) Glass suitable for tank melting.

Tap

a) To drain a furnace.
b) To remove excess slag from the floor of a pot furnace.
c) Opening in the side wall of furnace for (a) or (b).

Taper — *See* **'Conicity'**

Tarnish — A thin film of stain on the surface of glass.

Tear

a) An imperfection consisting of a small surface section of glass torn out by sticking to a hot metal.

b) *See* **'Pip'**.

Tear Drop — A small, rounded protuberance left in an article.

Teaser — The worker in direct charge of furnace operations who regulates to charging of batch and adjust fires.

Teemer — The person who teems or casts the pot of glass (*see also* **'Casting'**).

Telescope Flint — Optical flint with very high relative partial dispersion usually containing a substantial proportion of zinc oxide (ZnO).

Temper — The amount of residual stress in annealed ware measured by comparison with strain discs.

Tempered Glass — Glass that has been rapidly cooled from near the softening point, under rigorous control, to increase its mechanical and thermal endurance (*see also* **'Safety Glass'**).

Tg Point — *See* **'Transformation Points'**.

Thermal Endurance — A measure of the relative ability of glass to withstand sudden changes of temperature.

Thermal Shock — A sudden variation in temperature as applied to glassware.

Thermal Shock Test — A test in which glass is subjected to relatively sudden changes of temperature in order to determine its thermal endurance.

Timble — A refractory shape used for stirring pot-made optical glass.

Thread — A very fine but clearly defined cord.

Throat — A submerged passage between the melting and refining ends of a tank, also called 'Dog-Hole'.

Tinsel — Small flaky pieces of glass of paper thickness, powdered, graded and silvered or lacquered.

Tit — An imperfection; a small protrusion on a glass article.

Tongue Tile — In a port, the projecting partition between gas and air streams.

Toughened Glass — *See* **'Tempered Glass'** and **'Safety Glass'.**

Tower — A vertical chamber through which drawn sheet glass is passed in the Fourcault and the Pittsburgh processes.

Transfer Decoration — A decorative process in which a design is applied to the glass by means of a transfer.

Transfer Glass — Optical glass cooled in the pot in which it is melted.

Transformation Points — In the measurement of the thermal expansion coefficient of glass there may be two temperatures, the M_g and T_g points, at which the slope of the graph of expansion against temperature changes fairly sharply. At the M_g point (Deformation Point), viscous deformation of the sample makes accurate measurement of the thermal expansion, as such, impossible. The term is subject to the same lock of definition as the softening point. The T_g point occurs at a lower temperature usually below the annealing range of the glass.

Translucent Glass — Glass transmitting light mainly by diffuse transmission.

Transparent — Allowing light rays to be transmitted, without noticeable absorption so as to be distinctly seen through.

Triple-Cavity Process Mould — A mould possessing three cavities for simultaneous fabrication of three articles of glass.

Triple-Cavity Process — Any glass-forming process that uses three charges of glass and forms them simultaneously.

Triple-Gob Process — *See* **'Triple-Cavity Process'.**

Tubular Container — A container made from glass tubing.

Tackstone — Blocks placed on top of flux blocks to protect them from flame and gases and as a seal between them and the supported side and end walls.

Tuck Wall — The series of tuckstones or a wall serving the same purpose made of courses of bricks.

Tweel, Tuille — A counterweighted furnace door, opening vertically.

Twisted Scale — A scale with its centre line helically disposed on the tube.

U

Uneven Lines — Graduation lines of random dissimilarity in length.

Unfilled — An article incompletely formed when the glass is not entirely in contact with the mould wall during forming.

Updraw — The process of continuously drawing glass of various cross-sections, such as cane or tubing, by a method similar to the Fourcault process.

Updraw Process — The process of continuously drawing glass of various cross-sections, such as rod or tubing, upwards from an orifice and/or over a refractory cone.

Uptake — A flue connecting the portneck with the top of the regenerator or recuperator.

V

Vacuity — The space left above a liquid in a closed container to allow for possible expansion of the liquid. It may be expressed as a percentage of the liquid volume at the time of sealing. In the case of containers made of glass it is known as ullage.

Vacuum-and-Blow Process — A bottle manufacturing process whereby glass is gathered by vacuum and subsequently blown.

Vacuum Flask — A composite container comprising on outer protective case housing a refill and provided with a closure, stopper, and suitable means for its carrying.

V-Value — *See* **'Nu-Value'.**

Velle Process — A process for continuously drawing glass tubing (or cane), in which glass is fed downward to the draw through an annular orifice.

Vent

a) Small hole drilled through the wall of a low mould to allow air trapped between the mould and the glass to escape during final blowing.

b) *See* **'Check'.**

Vitrite — Black glasses used in the caps of electric lamps.

Volumetric — A term applied to graduated glassware, usually for laboratory or medical purposes.

Volumetric Glassware — *See* **'Graduated Glassware'.**

W

Warming-In — Reheating glass to permit further working, also for striking.

Warp

a) Lack of flatness of sheet or rolled glass.

b) Departure from straightness in length of glass tubing.

Washboard — An imperfection; ripples, waves, etc, on the surface of glassware.

Washboard-Ladders — Fine laps or ripples running horizontally on the external surface, usually on the sides of the article.

Water Glass — Sodium silicate glass that is soluble in water.

Water Marks — Local deformation or pattern caused by water in a paste mould.

Wave

a) An optical effect due to uneven glass distribution, or striae.

b) A defect resulting from irregularity of the surface of glass, making objects, viewed through it at varying angles, to appear wavy or bent.

Wavy Bottle — A glass bottle with an irregular inside surface.

Wavy Cord — Fine, rather diffuse cord(s) in the course of resorption.

Wavy Line — Graduation lines having a damped periodic or oscillatory character.

Weathering — Attack of a glass surface by atmospheric elements.

Wedged Bottom — *See* **'Slugged Bottom'**.

Welding — Joining two pieces of glass by heating and pressing together.

Welding Glass — Coloured glass to protect a welder's eyes from injurious radiations.

Westlake Process — An automatic process using vacuum gather for producing articles in paste moulds, simulating the action of a hand shop.

White Bead — A localized milkiness.

White Line — Occulsions of air bubbles in a joint of which the components had roughly cut or ground ends.

Wicket — A properly designed opening in a furnace normally kept sealed by a brick structure known as 'Wicket Wall'.

Wicket Wall — A wall, built into an opening in a furnace, which may be removed and rebuilt without disturbing the main furnace structure [*see also* **'Breast Wall (b)'**].

Window — *See* **'Bright'**.

Window Glass — *See* **'Sheet Glass'**.

Wired Glass — Flat glass with embedded wire mesh, squire or hexagonal, wired glass with embedded square mesh is called 'Georgian (*see also* '**Safety Glass**)'.

Fire Cast Glass — *See* '**Wired Glass**'.

Wired Safety Glass — *See* '**Wired Glass**'.

Wobble — *See* '**Rock**'.

Wool

a) *See* '**Glass Wool**'.

b) Fleecy mass of plain glass fibres.

Working End — The compartment of tank furnace where glass is conditioned and from which it is delivered or gathered for forming.

Working Range — The range of temperature in which glass is formed into ware in a specific process. At the upper end of the working range the glass is ready for working (generally at a viscosity of 10^3 to 10^4 poises), while at the lower end the glass is sufficiently viscous to hold its formed shape (generally at a viscosity of greater than 10^6 poises). For comparative purposes, but not necessarily in relation to any specific process, the working range of glass is assumed to correspond to a viscosity range from 10^4 to $10^{7.6}$ poises.

Wrinkle — *See* '**Chill Mark**'.

X

X-ray Protective Glass — Glass which contains a high percentage of lead oxide and sometimes also barium oxide, and which has a high degree of cpacity to X-rays, also called 'X-ray Shielding Glass'. The opacity of an 'X-ray glass is usually expressed in terms of the thickness of metallic lead which would give equal absorption of X-rays of specified wavelength.

X-Ray Shielding Glass — *See* '**X-ray Protective Glass**'.

Z

Zinc Crown Glass — A crown glass containing a substantial proportion of zinc oxide (ZnO).

(*Continued from page* 2)

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